2004 GALVESTON BAY INVASIVE SPECIES RISK ASSESSMENT
INVASIVE SPECIES SUMMARY
Created by: Environmental Institute of Houston, University of Houston-Clear Lake
and the Houston Advanced Research Center

Common Name: Asian tiger mosquito

Latin Name: *Aedes albopictus*

Category: Terrestrial Animal, or Aquatic Animal

Place of Origin: Northern Asia

Place of Introduction: "In August 1985, the Asian tiger mosquito was discovered breeding in discarded used tires in Houston, Texas and, within the next two years, populations had spread into 17 states. Current distribution is 25 states from Texas eastward to the Atlantic Ocean and as far north as Iowa. The known distribution of the Asian tiger mosquito in Ohio includes 8 locations - Ironton (Lawrence Co.) in 1997, Cincinnati (Hamilton Co.) and Portsmouth (Scioto Co.) in 1996, Coventry Township (Summit County) in 1993, Columbus (Franklin Co.) in 1992, Findlay (Hancock Co.), Greenville (Darke Co.), and Oak Hill (Jackson Co.) in 1987 (http://ohioline.osu.edu/hyg-fact/2000/2148.html)."

Date of Introduction: 1985

Life History: "The biology, life cycle, adaptability and distribution of this mosquito are being studied in parts of the United States. The egg stage will successfully overwinter in Ohio. Breeding occurs in used tires holding water in addition to tree holes, tin cans, bottles, etc. Scientists are almost positive that this mosquito entered this country in shipments of used tires from Northern Asia (probably Japan). The U.S. imported 4.5 million tires from Asia from 1983 to 1985 and the interstate commerce of used tires spread the mosquito to new locations.

The tiger mosquito could have been in the U.S. earlier than detected. LaCrosse encephalitis, which attacks primarily children under 15, is a viral disease that attacks the central nervous system. Ohio averages about 25 cases each year of the rarely fatal disease. Dengue virus causes severe headaches, light sensitivity, aching muscles throughout the body (known as Breakbone Fever since muscles and bones hurt so much it feels as if the bones might break) and sometimes death. A hemorrhagic fever syndrome (more deadly) occurs when a second infection occurs with a different strain of Dengue (http://ohioline.osu.edu/hyg-fact/2000/2148.html)."

Growth/Size: The body length is about 3/16-inch long (http://ohioline.osu.edu/hyg-fact/2000/2148.html).

Habitat: LARVAL HABITAT: "*Aedes albopictus* is an opportunistic container breeder that is capable of utilizing natural as well as artificial container habitats. Although the mosquito is most often associated with discarded tires in this country, it has the ability to adapt to an exceptionally wide range of confined water sources. The mosquito is known for its ability to survive in very small collections of water, requiring only 1/4" of depth to complete its life cycle. The larval habitats of the population discovered in the Keyport area included: airplane tires, truck tires, automobile tires, a wheel barrow tire, a 50 gal. drum, plastic buckets of various sizes, a dish pan, a plastic drink cup and a crushed aluminum beverage can. The mosquito was detected during a period where New Jersey went for more than a month without any rainfall. Shortly after one brief shower at the collection site, larvae were found in the holes of a socket-set case that had been discarded at one of the local marinas (http://www.rci.rutgers.edu/~insects/albo.htm.)"

Attitude (aggressive, etc.): "This mosquito, imported into the United States, is a very aggressive biter, known as a vector of Dengue (Breakbone Fever) in southeast Asia and a potential vector of yellow fever, dengue, LaCrosse encephalitis and dog heartworm in this country (Ohio has more recorded cases of LaCrosse encephalitis than any other state). This mosquito breeds in standing water found in discarded used tires and other containers (http://ohioline.osu.edu/hyg-fact/2000/2148.html)."

Physical Description: "Adults are known as tiger mosquitoes due to their conspicuous patterns of very black bodies with white stripes. Also, there is a distinctive single white band (stripe) down the length of the back. The body length is about 3/16-inch long. Like all adult mosquitoes, Asian tiger mosquitoes are small, fragile insects with slender bodies, one pair of narrow wings (tiny scales are attached to wing veins), and three pairs of long, slender legs. They have an elongate proboscis (beak) with which the female bites and feeds on blood, while males feed only on plant nectar. Eggs are elongate, usually 1/40-inch long, and dark brown to black near hatching. Larvae (wigglers) are filter feeders that move with an S-shaped motion. Pupae (tumblers) are comma-shaped, appearing to tumble through the water when disturbed (http://ohioline.osu.edu/hyg-fact/2000/2148.html)."

"LARVAL IDENTIFICATION: *Aedes albopictus* larvae are relatively easy to separate from associate species collected from artificial containers. The *Culex* species are easily recognized and can be separated in the dipper by their longer air tubes. *Aedes triseriatus* larvae have a darker coloration, a characteristic serpentine motion and an elongate body shape which are useful in screening field collections but should not be relied upon for separation of early instars. *Aedes atropalpus* (which are becoming extremely common in tires) closely resemble *Ae. albopictus* in general body shape but are easily separated under the microscope by their detached pecten teeth.

There are several useful characteristics to quickly isolate the *Ae. albopictus* larvae from field populations of *Ae. triseriatus*. The air tube of *Ae. albopictus* has a slightly inflated appearance and is much lighter in color than that of *Ae. triseriatus*. The anal gills of *Ae. albopictus* are much longer than the saddle and are equal in size. *Aedes triseriatus* has much smaller gills and the ventral pair is considerably shorter than the dorsal pair. Be aware, however, that gills frequently break off in preserved specimens. As a result, gill characteristics are most useful when observing living specimens. *Aedes triseriatus* has a single row of comb scales that are arranged in an extremely irregular fashion. The comb scales of *Ae. albopictus* are set in a concise single row and are, perhaps, the most diagnostic character for a quick species check in preserved specimens. The anal saddle of *Ae. albopictus* is nearly complete and requires turning the preserved specimen to observe the gap.. The anal saddle of *Ae. triseriatus* wraps approximately 3/4 of the way around the anal segment as it does in most 4th instar *Aedes* that have an incomplete saddle. A particularly useful characteristic is the fact that the nearly complete saddle is found in early instar specimens of *Ae. albopictus* as well as late instar larvae. The lateral hairs on the saddle are useful because they can be observed in living specimens without special orientation. The lateral hairs are double in *Ae. albopictus* and 5-7 branched *in Ae. triseriatus*. The 4 long caudal hairs of the dorsal brush in *Ae. albopictus* are a useful characteristic because they can be discerned at very low power but should not be used as the only characteristic to separate out this species (http://www.rci.rutgers.edu/~insects/albo.htm)."

Management Recommendations / Control Strategies: include references for existing site-specific strategies

"Control Measures

Compared with most mosquitoes, the Asian tiger mosquito is a very efficient transmitter of numerous human diseases and will seek out humans for a blood meal. So far, it has not been shown to be transmitting any disease in the United States. They can survive in a broad range of climates and conditions such as found in the United States and Latin America. They seem very adaptable, living in shade or sunny areas and breeding in water-holding containers (used tires as well as water-filled cavities in trees.)

Prevention

It is important to prevent the entry of mosquito eggs into the United States and Ohio. Treating individual used tires is a very difficult, expensive, and time-consuming procedure. Currently, the federal government requires all tire casings imported from Asia to be dry, clean and free of insects. Only about 5 percent of imported tires are inspected. It has been suggested that the inspections be dropped since they are so ineffective.

In Ohio, one needs to eliminate as many places as possible where mosquitoes breed. They need water for their offspring to develop. Even a small pool of water makes an excellent egg-hatching area. Look for and get rid of old tires, cans, bottles, and other water-holding containers. Unplug eave troughs, empty seldom-used children's pools and watering cans. Change water in bird baths. Tree holes and stumps which collect water should be drained and filled with mortar or sand and covered with Treekote or some other material to prevent mosquito breeding. Dispose of water-holding trash.

Waste Tire Problem in Ohio

Establishment of tire-shredding businesses throughout the state would greatly aid in the control of mosquitoes. To be profitable, such businesses may need some money from local and state governments. Used tires present major problems for mosquito control since they become ideal breeding sites for several disease vector mosquitoes. There are 14.7 million scrap tires generated each year in Ohio (more than 1 tire for each person in the state). The Ohio EPA now regulates the storage, transport, and disposal of used tires. Many landfills will not take tires and those that do charge a fee. At least 60 percent of LaCrosse encephalitis cases in Ohio can be associated with discarded tires. Keep tires dry, stacked and covered or stored indoors. Tires unsuitable for retreading may be drilled with holes to prevent water accumulation.

Insecticides

Initial screening tests in a New Orleans laboratory have shown that the Asian Tiger Mosquito may be as much as 5 to 6 times as difficult to kill as some of the native mosquitoes. Eradication is believed possible in fringe areas if detected before they spread. Currently, the Vector-borne Disease Program of the Ohio Department of Health believes the Asian Tiger Mosquito has been eliminated from Findlay and Greenville with the population greatly reduced in Oak Hill and Columbus where control efforts are being continued.

Control measures included using a combination of adulticides applied by Ultra-Low Volume spray. Malathion and resmethrin (Scourge) were used to control adults. Chlorpyrifos (Dursban) and Bacillus thuringiensis Berliner var. israelensis were used to control larvae in tires.

Monitoring Program

Five of the known sites in Ohio will continue to be under surveillance. Anyone suspecting the presence of, or collecting samples of specimens believed to be the Asian Tiger Mosquito in their area should contact: Vector-borne Disease Program, Ohio Department of Health, 900 Freeway Drive North, Columbus, Ohio 43229, Telephone: 614-752-1029, Fax: 614-752-1391 (http://ohioline.osu.edu/hyg-fact/2000/2148.html)."

References (includes journals, agency/university reports, and internet links):

1. http://ohioline.osu.edu/hyg-fact/2000/2148.html. Ohio State University Extension Fact Sheet Entomology 1991 Kenny Road, Columbus, Ohio 43210-1090.

2. http://www.rci.rutgers.edu/~insects/albo.htm. New Jersey Mosquito Newspaper.

3. http://www.cdc.gov/ncidod/eid/vol3no3/dl_moore.htm